GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH CODE:11 DIPLOMA PROGRAMME IN ELECTRONICS & COMMUNICATION ENGINEERING										
SEMESTER - II										
COURSE CODE	COURSE TITLE	TEACHING			CREDITS (L+T+P)	EXAMINATION SCHEME				
						THEORY		PRACTICAL		GRAND TOTAL
		L	T	P		ESE	PA	ESE	PA	
1990001	CONTRIBUTOR PERSONALITY DEVELOPMENET	4	0	0	4	70	30	20	30	150
3320002	ADVANCED MATHEMATICS (GROUP-1)	2	2	0	4	70	30	0	0	100
3300003	ENVIRONMENT CONSERVATION & HAZARD MANAGEMENT	4	0	0	4	70	30	0	0	100
3321101	ELECTRONIC CIRCUITS & APPLICATIONS	4	0	4	8	70	30	40	60	200
3321102	ELECTRONIC NETWORKS	3	2	2	7	70	30	20	30	150
3321103	ELECTRONICS WORKSHOP	0	0	4	4	0	0	40	60	100
		17	4	10						
TOTAL					31	350	150	120	180	800

ESE : END SEMESTER EXAM
PA: PROGRESSIVE ASSESSMENT
L: LECTURE
T: TUTORIAL
P: PRACTICAL

ESE for Practical includes Viva/Practical exam/Performance etc.
PA for Practicals includes TW/Report writing/Seminar etc. related to practices
PA for Theory includes Written Exam /Assignment/Quiz/Presentation or Combination of all with prior intimation to the students at beginning of term

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Environment Conservation & Hazard Management
(Code: 3300003)

Diploma Programmes in which this course is offered	Semester in which offered
Biomedical Engineering, Ceramic Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Environment Engineering, Fabrication Technology, Information Technology, Instrumentation & Control Engineering, Mechanical Engineering, Mining Engineering, Textile Design, Transportation Engineering	**First Semester**
Architecture Assistantship, Automobile Engineering, Chemical Engineering, Electronics & Communication, Mechatronics Engineering, Metallurgy Engineering, Plastic Engineering, Power Electronics, Printing Technology, Textile Manufacturing, Textile Processing	**Second Semester**

1. RATIONALE

For a country to progress, sustainable development is one of the key factors. Environment conservation and hazard management is of much importance to every citizen of India. The country has suffered a lot due to various natural disasters. Considerable amount of energy is being wasted. Energy saved is energy produced. Environmental pollution is on the rise due to rampant industrial mismanagement and indiscipline. Renewable energy is one of the answers to the energy crisis and also to reduce environmental pollution. Therefore this course has been designed to develop a general awareness of these and related issues so that the every student will start acting as a responsible citizen to make the country and the world a better place to live in.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies.

i. **Take care of issues related to environment conservation and disaster management while working as diploma engineer.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
4	0	0	4	70	30	0	0	**100**

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; C – Credit;
ESE - End Semester Examination; **PA** - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Ecology and environment	1.1 Enhance knowledge about engineering aspects of Environment 1.2 Correlate the facts of ecology and environment A 1.3 assess the effect of pollution 1.4 List the causes of environmental pollution 1.5 State the major causes of air, water and noise pollution 1.6 Describe how industrial waste contaminates the land 1.7 Describe the effects of radiation on vegetables, animals	1.1 Importance of environment and scope 1.2 Engineering and environment issues 1.3 The natural system, Biotic and a-Biotic components and processes of natural system 1.4 Eco system, food chain and webs and other biological Systems, 1.5 Causes of environmental pollution 1.6 Pollution due to solid waste 1.7 water pollution, air pollution, the Noise as pollution, 1.8 Pollution of land due to industrial and chemical waste 1.9 Radiation and its effects on vegetables and animals
Unit– II Sustainable Development	2.1 Explain the concept of sustainable development 2.2 Justify the need for renewable energy 2.3 Describe the growth of renewable energy in India 2.4 Explain the concepts of waste management and methods of recyling	2.1 Concept of sustainable development, 2.2 Natural resources, a-biotic and biotic resources 2.3 Principles of conservation of energy and management 2.4 Need of Renewable energy 2.5 Growth of renewable energy in India and the world 2.6 Concept of waste management and recyling
Unit – III Wind Power	3.1 Describe the growth of wind power in India 3.2 State the differences between VAWTs and HAWTs 3.3 Explain the differences between drag and lift type wind turbines 3.4 Describe the working of large wind turbines 3.5 List the types of aerodynamic control of large wind turbines 3.6 Name the generators used in large wind turbines	3.1 Growth of wind power in India 3.2 Types of wind turbines – Vertical axis wind turbines (VAWT) and horizontal axis wind turbines (HAWT) 3.3 Types of HAWTs – drag and lift types 3.4 Working of large wind turbines 3.5 Aerodynamic control of large and small wind turbines 3.6 Types of electrical generators used in small and large wind turbines
Unit – IV Solar Power	4.1 Describe the salient features of solar thermal and PV systems 4.2 Describe a solar cooker and solar water heater 4.3 Describe the working of solar PV system 4.4 State the salient features of polycrystalline, monocrystalline and thin film PV systems	4.1 Features of solar thermal and PV systems 4.2 Types of solar cookers and solar water heaters 4.3 Solar PV systems and its components and their working 4.4 Types of solar PV cells 4.5 Solar PV and solar water heaters, rating and costing
Unit – V Biomass energy	5.1 State the different types of biomass energy sources 5.2 Describe about the energy content in biomass 5.3 Describe the working of simple biogas plant	5.1 Types of Biomass Energy Sources 5.2 Energy content in biomass of different types 5.3 Types of Biomass conversion processes 5.4 Biogas production

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – VI Seismic Engineering and disaster management	6.1 Explain the principles of seismic Engineering in design of structure 6.2 State the appropriate actions to be taken during disasters	6.1 Introduction of seismic engineering and its application civil engineering designs 6.2 Features of disasters such as Floods, Earthquakes, Fires, Epidemics, Gas/radioactive leaks etc. 6.3 Management and mitigation of above disasters

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1.	Ecology and Environment	8	4	4	0	8
2.	Sustainable Development	10	4	5	1	10
3.	Wind Power	10	4	6	4	14
4.	Solar Power	10	4	6	4	14
5.	Biomass energy	8	4	4	2	10
6.	Seismic Engineering and disaster	10	6	6	2	14
	Total	**56**	**26**	**31**	**13**	**70**

Legends:
R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxomonoy

6. SUGGESTED LIST OF EXPERIMENTS/PRACTICAL EXERCISES

Nil

7. SUGGESTED LIST OF STUDENT ACTIVITIES

i. Prepare paper on various sustainable development
ii. Make a report after gathering information the values of water, noise pollution and air pollution in your city/town and compare the values in other cities and towns in India with respect to environmentally acceptable levels
iii. Prepare a paper on air and water pollution in an industry/institute
iv. Undertake some small mini projects in any one of the renewable energies
v. Visit an energy park and submit project on various sources of energy
vi. Prepare powerpoint on clean and green technologies
vii. Prepare a list of do's and don'ts applicable during disasters
viii. Submit a report on garbage disposal system in your city/town.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Title of Book	Author	Publication/Year
1	Renewable Energy Technologies	Solanki, Chetan Singh	PHI Learning, New Delhi, 2010
2	Ecology and Control of the Natural Environment	Izrael,Y.A.	Kluwer Academic Publisher
3	Environment Engineering and Disaster Management	Sharma, Sanjay K.	Luxmi Publications, New Delhi
4	Environmental Noise Pollution and Its Control	Chhatwal,G.R.; Katyal,T.; Katyal,	Anmol Publications, New Delhi
5	Wind Power Plants and Project Development	Earnest, Joshua & Wizelius, Tore	PHI Learning, New Delhi, 2011
6	Renewable Energy Sources and Emerging Technologies	Kothari, D.P. Singal, K.C., Ranjan, Rakesh	PHI Learning, New Delhi, 2009
7	Environmental Studies	Anandita Basak	Pearson
8	Environmental Science and Engineering	Alka Debi	University Press
9	Coping With Natural Hazards, Indian Context	K. S. Valadia	Orient Longman
10	Engineering and Environment	Edward S. Rubin	Mc Graw Hill Publ.

B. List of Major Equipment/ Instrument

i. Digital sound level meters (to check noise pollution)
ii. Digital air quality meter (to measure air pollution)
iii. Digital handheld anemometer (to measure wind speeds)
iv. Digital hand held pyranometer (to measure solar radiation levels)

C. List of Software/Learning Websites

i. http://www1.eere.energy.gov/wind/wind_animation.html
ii. http://www.nrel.gov/learning/re_solar.html
iii. http://www.nrel.gov/learning/re_biomass.html
iv. http://www.mnre.gov.in/schemes/grid-connected/solar-thermal-2/
v. http://www.mnre.gov.in/schemes/grid-connected/biomass-powercogen/

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. H.L.Purohit** , HOD, Civil Engg. Dept. L.E.College. Morbi
- **Shri. P.A.Pandya**, LCE, Civil Engg. Dept, G.P , Himatnagar

Co-ordinator and Faculty Members from NITTTR Bhopal

- **Dr. J.P.Tegar**, Professor Dept of Civil and Environmental Engg, NITTTR, Bhopal.
- **Dr. Joshua Earnest,** Professor and Head, Dept. of Electrical & Electronics Engg, NITTTR, Bhopal

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Advance Mathematics (Group-1)
(Code: 3320002)

Diploma Programmes in which this course is offered	**Semester in which offered**
Biomedical Engineering, Chemical Engineering, Electrical Engineering, Computer Engineering, Electronics & Communication Engineering, Information Technology, Power Electronics	**Second Semester**

1. RATIONALE

The course is classified under Advance Mathematics and students are intended to understand the advance concepts and principles of Mathematics such as calculus, complex numbers and differential equations. This knowledge is required to understand and solve engineering problems.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of mathematical skills so that students are able to acquire following competencies:

- **Use proper Mathematical tool to understand engineering principles and concepts.**
- **Apply concepts of calculus or suitable mathematical tool to solve given engineering problems**.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			**Total Credits (L+T+P)**	**Examination Scheme**				
				Theory Marks		**Practical Marks**		**Total Marks**
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	
2	2	0	4	70	30	0	0	**100**

Legends: **L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit; **ESE** -End Semester Examination; **PA** - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for **PA of theory** & **ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Complex Number	**1a**.Simplify Complex expressions **1b**.Find Modulus and Amplitude of given expressions **1c**.Use De Moivre's Theorem to simplify mathematical expressions and to find roots	Concept, Modules and Amplitude form, Root of Complex Number, De Moivre's Theorem. Apply concept of complex numbers in simple engineering problems.
Unit– II Function & Limit	2a .Solve the problems using functions 2b .Solve the problem of function using the concept of Limit	**2.1 Function** Concept and Examples **2.2 Limit** Concept of Limit, Standard Formulae and related Examples.
Unit– III Differentiation & it's Applications	**3a**.Differentiate the various function **3b**.Apply the differentiation to Velocity, Acceleration and Maxima & Minima	**3.1Differentiation**: Definition, Rules of, Sum, Product, Quotient of Functions, Chain Rule, Derivative of Implicit functions and Parametric functions, Logarithmic Differentiation. Successive Differentiation up to second order **3.2 Application:** Velocity, Acceleration, Maxima & Minima.(simple problems)
Unit– IV Integration & its application	**4a** .Integrate the various function **4b** .Apply the Integration for finding Area and Volume	**4.1 Integration**: Concept, Integral of Standard Functions, Working Rules of Integration, Integration by Parts, Integration by Substitution Method, Definite Integral and its properties. **4.2 Application:** Area and Volume.(simple problems)
Unit-V Differential Equations(First Order First Degree)	**1a.**Find the Order and Degree of a Differential Equation. **1b.** Form a Differential Equation for simple Engineering problems **1c.** Solve Differential Equations using Variable Separable, Homogeneous and Integrating Factor methods.	**5.1** Definition, Order and Degree of Differential Equation **5.2** Formation of DE **5.3** Solution of DE of First Degree and First Order by Variable Separable, Homogeneous and Integrating Factor methods.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Complex Number	3	2	5	3	10
II	Function & Limit	4	3	5	4	12
III	Differentiation & its Application	8	4	8	6	18
IV	Integration & its Application	8	4	8	4	16
V	Differential Equations	5	2	8	4	14
Total		**28**	**15**	**34**	**21**	**70**

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The exercises should be properly designed and implemented with an attempt to develop different types of mathematical skills so that students are able to acquire above mentioned competencies.

S. No.	Unit No.	Practical Exercises
1	I	Complex Number, Practice Examples
2		Use software for further understanding of applications
3	II	Practice Examples of Function & Limit
4		Use of Various Method/Techniques
5	III	Differentiation and Related Examples
6		Solve problems related to various methods/techniques of differentiations
7		Identify the Engineering Applications from respective branches and solve the problems
8	IV	Integration & Related Examples.
9		Solve problems Related to Various Methods/Techniques of integration
10		Identify the Engineering Applications from respective branches and solve the problems
11	V	Identify the corresponding Engineering Applications for differential equations from respective branches and solve the problems.

Note: The above Tutor sessions are for guideline only. The remaining Tutorial hours are may be used by teachers appropriately for revision and practice.

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like: course/topic based seminars, internet based assignments, teacher guided self learning activities, course/library/internet/lab based Mini-Projects etc. These could be individual or group-based. Some of these activities may be as below:

1. Applications to solve identified Engineering problems and use of Internet.
2. Learn graphical sofwares:EXCEL,DPLOT,GRAPH etc.
3. Learn MathCAD to use Mathematical Tools and solve the problems of Calculus.
4. Learn MATLAB and use it to solve the identified problems.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Author	Title of Books	Publication
1	Anthony croft and others	Engineering Mathematics (third edition)	Pearson Education,2012
2	Pandya N R	Advanced Mathematics for Polytechnic	Macmillan Publishers India Ltd.,2012
3	Deshpande S P	Polytechnic Mathematics	Pune Vidyarthi Gruh Prakashan,1984
4	Prakash D S	Polytechnic Mathematics	S Chand,1985

B. List of Major Equipment/ Instrument

1. Simple Calculator
2. Computer System with Printer, Internet
3. LCD Projector

C. List of Software/Learning Websites

1. Excel
2. D Plot
3. Graph
4 MathCAD
5. MATLAB

You may use other Software like Mathematical and other Graph

Plotting software. Use websites such as wikipedia.org, mathworld.wolfram.com Etc…

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

Faculty Members from Polytechnics

- **Dr. N. R. Pandya**, HOD-General Dept.,Govt. Polytechnic, Ahmedabad
- **Dr N A Dani**, Lecturer,Govt. Polytechnic,Junagadh.
- **Prof. (Smt) R L Wadhwa**, Lect Govt Polytechnic,Ahmedabad
- **Prof. H C Suthar**, BPTI,Bhavnagar
- **Prof. P N Joshi**, Govt Polytechnic,Rajkot

Coordinator and Faculty Member From NITTTR Bhopal

- **Dr. P. K. Purohit**, Associate Professor, Dept. of Science.
- **Dr. Deepak Singh**, Associate Professor, Dept. of Science.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Electronic Circuits and Applications
(Code: 3321101)

Diploma Programme in which this course is offered	**Semester in which offered**
Electronic and Communication Engineering	Second Semester

1. RATIONALE

This course will enable students to develop the skills required to use basic electronic devices in various electronic circuits. Through the study of this course the students will understand the construction, working, characteristics and applications of various types of semiconductor components such as diodes and transistors, which are basic building block of amplifier, oscillator, switching circuit, wave shaping circuit and power supply. The knowledge of this core subject is essential for comprehending the courses that will be introduced later in the diploma programme as well as developing requisite skills for effective functioning in the industry.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competency:

- **Analyse analog circuits consisting of active electronic components.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			**Total Credits (L+T+P)**	**Examination Scheme**				
				Theory Marks		**Practical Marks**		**Total Marks**
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	**200**
4	0	4	8	70	30	40	60	

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

Note: It is the responsibility of the institute heads that marks for **PA of theory** & **ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Diode Application and Special Purpose Diodes**	1a. Explain working of clipper and clamper.	1.1 Basic diode circuits, clipper and clamper, voltage doubler
	1b. Describe working, characteristic and applications of different diodes.	1.2 Zener diode as a voltage regulator 1.3 Varactor diode, schottky barrier diode, crystal diode
	1c. Explain the working and applications of photo devices.	1.4 Photo Diode, LDR, Photovoltaic Cell, Photo Transistor, Light Emitting Diode, Opto coupler, 7-Segment Display, OLED, AMOLED, Multi color LED
Unit – II **Transistor Amplifier and Applications**	2a. Compare working of CB, CE and CC amplifier.	2.1 Transistor Amplifier: CB, CE, CC 2.2 Comparison of CB,CE and CC Amplifier
	2b. Calculate parameters of CB, CE, CC transistor amplifier.	2.3 Load line consideration and operating point 2.4 Amplifier Parameters: A_v, A_i, A_p, R_o, R_i
	2c. Explain the need for Darlington Pair.	2.5 Darlington Pair and its applications
	2d. Describe application of transistor as a Relay Driver and Tuned Amplifier.	2.6 Transistor used as a Relay Driver
		2.7 Transistor used as a Tuned Amplifier
Unit – III **Transistor Biasing Circuits and Thermal Stability**	3a. Test different biasing circuits. 3b. Define thermal instability and its adverse effect on working of any circuit.	3.1 Biasing; Biasing Circuits: Fixed Bias, Collector to Base bias, Emitter Bias and Voltage divider bias 3.2 Thermal instability
	3c. Justify the need of heat sink. 3d. Select appropriate heat sink.	3.3 Thermal Runaway and Stability Factor 3.4 Thermal Resistance 3.5 Heat Sink 3.6 Types of Heat sink: Shape, Size, Color, Material
Unit – IV **Frequency Response of Transistor Amplifier**	4a. Define amplifier parameters: gain, Bandwidth and Gain – bandwidth product . 4b.Determine frequency response of CE amplifier using different types of coupling. 4c. Describe the various types of couplings of amplifier.	4.1Gain, Bandwidth and Gain-Bandwidth product 4.2 Effect of Emitter Bypass Capacitor and Coupling Capacitor on frequency response 4.3 Frequency Response of Single Stage Amplifier 4.4 Different Coupling Techniques for cascading: Direct, RC, LC and Transformer 4.5 Frequency Response of Two Stage RC-Coupled amplifier
Unit – V	5a.Describe importance of	5.1 Two port network ,h-parameters and its equivalent

Unit	Major Learning Outcomes	Topics and Sub-topics
Hybrid Parameters	h- parameters of the two port network. 5b. Analyse CE amplifier using h-parameters.	circuits 5.2 h-parameters for CE amplifier 5.3 CE Amplifier parameters- A_v, A_i, A_p, R_o, R_i using h- parameters (No Derivations)
Unit – VI **Regulated Power Supply**	6a. Explain parameters of the regulator and the need of regulated DC power supply. 6b. Explain the working of different voltage regulator circuits.	6.1 Regulated power supply (module level) 6.2 Shunt voltage regulator (module level) 6.3 Transistorized series voltage regulator (basic and with feedback, without derivation) 6.4 Three Terminal Fixed/variable voltage regulator: 78xx, 79xx, LM317
	6c. Explain need, working at module level, advantage, disadvantages and applications of SMPS. 6d. Compare LRPS and SMPS. 6e. Explain working of UPS at module level for offline and online.	6.5 Switch mode power supply(SMPS) 6.6 Uninterruptible power supply(UPS)

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Diode application and special purpose diodes	10	2	6	6	14
II	Transistor biasing circuits and thermal Stability	10	2	6	4	12
III	Transistor amplifier	10	4	6	4	14
IV	Frequency response of transistor amplifier	10	4	6	2	12
V	Hybrid parameters	6	2	2	2	6
VI	Regulated power supply	10	2	4	6	12
Total		**56**	**16**	**30**	**24**	**70**

Legends:R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The experiments should be properly designed and implemented with an attempt to develop different types of skills leading to achieve the competency. Following is the list of experiments for guidance.

S. No.	Unit No.	Practical/Exercise	Apprx. Hrs. Required
1	I	Use multimeter for measuring electrical parameter, value of passive component like resistor and capacitor and testing of diode, transistor.	02
2	I	Determine voltage and frequency of sine, square and triangular wave signal using CRO.	02
3	I	Build various types of clipper circuit and observe input –output waveforms. Design a diode clipper circuit for the given value of clipping voltage.	02
4	I	Build various types of clamper circuit and observe input – output waveforms. Design a diode clamping circuit for the given value of clamping voltage.	02
5	I	Obtain the V-I Characteristic of zener diode.	02
6	I	Design voltage regulator for the given value of regulated voltage using zener diode.	02
7	I	Obtain V-I characteristic of photo diode.	02
8	I	Obtain the V-I Characteristic of LDR.	02
9	I	Build and display alphanumeric character using single/multi coloured LED.	02
10	I	Display numbers using 7 segment LED (Common Anode and Common Cathode- Both)	02
11	II	Test thermal stability of fixed biased type amplifier.	02
12	II	Build and test voltage divider biased type amplifier and measure voltage at different points on the circuit and observe waveforms.	02
13	III	Obtain input and output characteristics and calculate gain of CE amplifier circuit.	02
14	III	Obtain input and output characteristics and calculate gain of CB amplifier circuit.	02
15	III	Build amplifier using Darlington pair and calculate its gain.	02
16	IV	Obtain frequency response of single stage transistor amplifier.	02
17	IV	Obtain frequency response of two stage RC-coupled amplifier.	02
18	V	Calculate h-parameters of given transistor using data sheet.	02
19	VI	Calculate line regulation of SMPS.	02
20	VI	Build voltage regulator using 78xx and 79xx and measure the dropout voltage for the given voltage regulator.	02
21	VI	Build variable voltage regulator using LM317 and measure the dropout voltage for the given voltage regulator.	02
22	VI	Demonstration of working of UPS (Online/Offline).	02
23	All	Build and test one mini project using basic electronic components and general purpose PCB.	02
		Total	**46**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Build circuit/mini project using electronic components.
- PPT Presentation/Seminar on syllabus topic/mini project.
- Simulate experiments using available Electronic Design Automation Tools like Circuit maker, Tina, Multisim, Electronic work bench etc.

8. SUGGESTED LEARNING RESOURCES

(A) List of Books:

S. No.	Title of Books	Author	Publication
1	Electronic Principles with simulation CD	Malvino A.P	MGH, 2009 or latest
2	Electronic Devices and Circuit Theory	Boylestad Robert	Pearson, 2007 or latest
3	Principles of Electronics	Mehta V.K	S. Chand, or latest
4	Electronic Devices and Circuits	Bell David A	Oxford University Press, 2008 or latest
5	Basic Electronics – A text lab manual	Zbar Paul B, Malvino Albert Michael Miller	MGH, latest edition
6	Basic Electronics and Linear Circuits	Kulshreshtha, Bhargava and Gupta	TMH, 2006 or latest

Other Learning Resources

- Electronic Component Data sheets - BPB Publications, New Delhi
- Electronics engineering magazines like EFY, Elector etc.

B. List of Major Equipment/Materials

i. Function Generator
ii. Multimeter
iii. D.C. Power Supply
iv. Variac
v. Cathode Ray Oscilloscope
vi. Digital Storage Oscilloscope
vii. Experimental Trainer Kits, Bread Board, General Purpose PCB

C List of Software/Learning Websites

i. Electronic Work Bench/MultiSIM
ii. www.nptel.com
iii. www.ocw.mit.edu

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. S.N.Sampat**, Senior Lecturer, Department of Electronics and Communication, Government Polytechnic, Gandhinagar
- **Prof.(Smt.) Kundan N. Vaghela**, Senior Lecturer, Department of Electronics and Communication, Government Polytechnic, Ahmedabad
- **Prof. N.B.Shah**, Senior Lecturer, Department of Electronics and Communication, Government Polytechnic,Vadnagar
- **Prof. B.P.Raval**, Senior Lecturer, Department of Electronics and Communication, Government Polytechnic, Rajkot

Coordinator and Faculty Members from NITTTR Bhopal

- **Prof.(Mrs.)Susan S. Mathew**, Associate Professor, Dept. of Electrical and Electronics Engg.
- **Dr.(Mrs.)Anjali Potnis**, Assistant Professor, Dept. of Electrical and Electronics Engg.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title**:** Electronic Networks
(Code: 3321102)

Diploma Program in which this course is offered	Semester in which offered
Electronics and Communication Engineering	Second Semester

1. RATIONALE

Electronic networks is a core area, the knowledge of which is essential for electronic engineering diploma holders and they need to assimilate it in order to succeed in the Industry. In this regard, the basic knowledge of various theorems, resonance, filtering and attenuation related to passive electronic components is essential. Understanding of these concepts will be useful to determine the various parameters required to solve various problems and applications. This course has been designed to achieve these aims.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Analyse electronic networks in terms of voltage, current, power, attenuation and frequency response.**

3 . TEACHING & EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
3	2	2	7	70	30	20	30	

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit **ESE** - End Semester Examination; **PA** - Progressive Assessment

Note: It is the responsibility of the institute heads that marks for **PA of theory** & **ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Network Elements and Network Topology**	1a. Differentiate between voltage source and current source.	1.1 Conversion of voltage source to Current Source (Ideal and Practical) and vice versa
	1b. Determine voltage, current and power relationship for resistors connected in series, parallel and in combination 1c. Determine voltage, current and power relationship for capacitors connected in series, parallel and in combination 1d. Determine voltage, current and power relationship for capacitors connected in series, parallel and in combination 1e. Analyze the circuit to calculate voltage and current at various points in circuit	1.2 Resistors connected in series, parallel and in combination 1.3 Capacitors connected in series, parallel and in combination 1.4 Inductors connected in series, parallel and in combination 1.5 Voltage and Current division method 1.6 Branch, Node, Loop, Mesh and terms related to network topology
	1f. Describe various terms related to network topology 1g. Compare various types of networks 1h. Define terms related to impedances of multi-port network	1.7 Passive and Active network, Linear and Non- linear , Lumped and Distributed , Unilateral and Bilateral, Symmetrical and Asymmetrical, Single port and Double port, Three and Four terminals 1.8 Transfer Impedance, Driving point Impedance, Image Impedance and Terminating Impedance, Input and Output Impedances
	1i. Describe steps to obtain characteristic impedance of standard T and π networks (Z_{OT} and $Z_{O\pi}$) 1j. Describe steps to obtain relation between Z_{OT} and $Z_{O\pi}$ 1k. Describe steps of conversion between T to π networks and vice versa	1.9 Characteristic Impedance of standard T and π networks (Z_{OT} and $Z_{O\pi}$) and relation between them 1.10 T to π and π to T networks conversion or Star to Delta and Delta to Star conversion
Unit– II **Network Theorems**	2a. Analyse the circuit to Calculate voltage and current in the given resistive circuits using KCL and KVL 2b. Analyse the resistive circuits to calculate voltage and current using Mesh and nodal analysis method 2c. Explain the steps to find the dual of given circuit having R-L-	2.1 Kirchhoff's Voltage and Current law(KVL and KCL) 2.2 Mesh Analysis and Nodal Analysis of Networks 2.3 Principle of Duality

Unit	Major Learning Outcomes	Topics and Sub-topics
	2d. Explain the steps to Calculate the current in any branch of the circuit using Superposition Theorem. 2e. Use Superposition Theorem to calculate the current in any branch of the circuit. 2f.Explain the steps to calculate the Vth, Rth and load current in the circuit using Thevenin's Theorem. 2g.Use Thevenin's Theorem to calculate V_{th}, R_{th} and load current in the given circuit. 2h. Explain the steps to calculate the load current in the circuit using Norton's Theorem. 2i. Calculate the load current in the given circuit using Norton's Theorem. 2j. Describe the Maximum Power Transfer condition for any given circuit 2k. Define the Reciprocity Theorem	2.4 Super Position Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem
Unit– III **Resonance and Coupled Circuits**	3a Determine Quality factor of a Coil and Capacitor. 3b Analyse the behavior of Series and Parallel resonant circuit using frequency response curve and calculate resonance frequency and various parameters of Series and Parallel resonant circuit. 3c.Compare the performance of single tuned and double tuned circuit (without derivation).	3.1 Quality factor or Q-factor of coil and capacitor 3.2 Series and parallel resonant circuit, resonance frequency, impedance at resonance, bandwidth and selectivity of series and parallel resonance circuit. 3.3 Coupled circuit**,** mutual inductance 3.4 Transformers: Iron core, Air core, single tuned and double tuned air core transformer used in tuned circuit
Unit – IV **Attenuators and Equalizers**	4a. Classify various types of attenuators. 4b. Explain relation between decibel and neper 4c. Using the relation N= Is / IR obtain the equations of R1 and R2 for Symmetrical T and π types of attenuators offering given amount of attenuation(Kirchhoff's Laws and Mesh analysis)	4.1 Attenuators, T and π attenuators, Lattice attenuators

Unit	Major Learning Outcomes	Topics and Sub-topics
	4d. Define Lattice attenuator	
	4e. Classify various types of equalizers. 4f. Explain series and shunt amplitude equalizers and obtain the equations for power ratio. 4g. Describe bridge T and lattice phase equalizers.	4.2 Series and Shunt amplitude Equalizers 4.3 Bridge T and Lattice Phase equalizers
Unit – V Filters	5a. Classify the various passive filter circuits. 5b. Derive the cut-off frequency equations for constant-k type, T and π sections of low Pass and High Pass filters 5c. Use the pass band equation $-1 < Z1 / 4Z2 < 0$ to obtain the equation of cut-off frequency for Constant-k type T & π sections– Low Pass and High Pass filters and calculate fc. 5d. Use the equations $R_0^2 = L / C$ and the equation for fc to obtain the equations for L and C and calculate values of L and C for given specifications. 5e. Describe limitations of constant-k type filters. 5f. Use the equation Z_{OT} and $Z_{O\pi}$ to obtain the equation of m in terms of fc and f∞ for m-derived T & π sections – Low Pass and High Pass filters and calculate values of m, L and C for given specifications. 5g. Explain band pass and band stop filter using Low pass and high pass filter. 5h. Compare high pass, low pass, band pass and band stop filters.	5.1 Passive Filters: Constant 'k' and 'm' derived type T and π sections – Low Pass, High Pass, 5.2 Band pass and band stop filters

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Network Elements and Network Topology	08	04	06	00	10
II	Network Theorems	10	04	08	08	20
III	Resonance and Coupled Circuits	08	02	06	04	12
IV	Attenuators and Equalizers	08	02	06	06	14
V	Filters	08	02	06	06	14
Total		**42**	**14**	**32**	**24**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The exercises/practical should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire above mentioned competency.

S. No.	Unit No.	Practical/Exercise	Apprx. Hours Required
1.	II	For a given multisource network, determine the output impedance and voltage and verify it using Thevinin's Theorem	02
2.	II	For a given multisource network, determine the value of current in the specified branch and verify it using Superposition theorem	02
3.	II	For a given multisource network, determine the output impedance and voltage and verify it using Norton's Theorem	02
4.	II	For a given multisource network, determine the output impedance and voltage and verify it using Maximum power transfer theorem.	02
5.	III	For series resonance circuit, determine the frequency response curve to obtain the resonant frequency, resonant impedance, Bandwidth (BW) and Quality factor for series resonance circuit.	02
6.	III	For a parallel resonance circuit, determine the frequency response curve to obtain the resonant frequency, resonant impedance, Bandwidth (BW) and Quality factor.	02
7.	IV	Build and test T-type, π-type attenuator for given attenuation.	02
8.	IV	Build and test Lattice attenuator for given attenuation.	02
9.	IV	Measure Transfer Impedance, Driving point Impedance, Image Impedance and Terminating Impedance, Input and Output Impedances for given two-port network.	04
10.	V	For the given parameters, build constant k-low pass filter (T and π sections)	02
11.	V	For the given parameters, build constant k-high pass filter (T and π sections)	02
12.	V	Obtain the frequency response curve for the given m -derived low pass and high pass filter.	02
		Total	**26**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

- Teacher guided tutorial exercises to solve problems based on all units.
- Implement small circuits on bread board and verify the design.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Title of Book	Author	Publication
1.	Network Analysis	Mithal G. K.	Khanna Publication , 2008 or latest edition
2.	Network Analysis and Synthesis	Chakraborti A.	Dhanpat Rai Publication,2009 or latest edition
3.	Networks and Transmission lines	T. Anil Kumar	Pearson Education, 2006 or latest edition
4.	Networks Lines and Fields	Ryder J. D.	Prentice Hall Inc. 2008 or latest edition
5.	Network Analysis	M.E.Van Valkenburg	Prentice Hall Inc. 2011 or latest edition

B. List of Major Test and Measuring Instruments and other components

i. Breadboard, Experimental boards for study of series and parallel resonance circuits and different types of filters
ii. Function generator
iii. Regulated power supply
iv. Multi-meter
v. LCR-Q meter

C. List of Learning Websites

i. http://www.nptel.com
ii. http://www.allaboutcircuits.com/vol_1/index.html
iii. http://en.wikipedia.org/wiki/Electrical_network
iv. http://www.mhhe.com/engcs/electrical/hkd/tutmenu.htm
v. http://en.wikipedia.org/wiki/Network_analysis_(electrical_circuits)
vi. http://www.indianshout.com/tag/circuit-theory-study-material

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. R. D. Raghani**, HOD, Dept. of Electronics and Communication, L.E. College of Engineering, Morbi

- **Prof.(Smt.) K. R. Shah**, Sr. Lecturer, Dept. of Electronics and Communication, Government Polytechnic, Ahmedabad

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- **Dr.(Mrs.) Anjali Potnis**, Assistant Professor, Dept. of Electrical and Electronics Engg.

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Electronics Workshop
(Code: 3321103)

Diploma Programmes in which this course is offered	Semester in which offered
Electronics & Communication Engineering	Second Semester

1. RATIONALE

Students have learned about different electronic components and devices in 'Electronic Components and Practice' course in the First semester. This course of 'Electronics Workshop Practice' is aimed to provide the students with more hands-on experience and also enable them to develop and test simple PCB circuits. Selection of components, wiring, soldering, de-soldering, testing and troubleshooting, are some of the basic skills required by industry from any electronics engineering diploma holder. Students also need to develop enough learning confidence to complete entire project work related to various courses in subsequent higher level semesters. Hence, this course is designed to develop these vital skills required by the electronic industry through various laboratory experiences and strategies like mini-projects.

2. COMPETENCY

The course content should be implemented with the aim to develop different types of skills leading to the achievement of the following competency:

- **Test self-built electronic circuits comprising of discrete electronic components.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	
0	0	4	4	0	0	40	60	100

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit **ESE** - End Semester Examination; **PA** - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for **PA of theory** & **ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENT

Unit	Major Practical Learning Outcomes	Topics and Sub-topics
Unit – I **Electronic Components, Measuring Instruments and Tools**	1a. Identify a particular component from the given group of passive electronic components	1.1 Passive components**:** Different types of: resistors, inductors, capacitors, potentiometers, Thermistor, Transformer, auto transformer
	1b. Identify the terminals of active electronic components .	1.2 Active components**:** Diode, Zener diode, Varactor diode, LED, Photo diode, BJT**,** Photo transistor, FET, LDR, Solar cell, Photocell, Opto-coupler
	1c. Use voltage source. 1d. Use test and measuring instruments.	1.3 Voltage Sources: DC battery (Pencil cell :1.5V, AAA,AA Type, +9V, Rechargeble Cell, Mobile battery) AC power supply, DC power supply 1.4 Measuring Instruments**:** Different types of Voltmeters, Ammeters, Watt meters, multimeter, LCR-Q meter, CRO, DSO, Function Generator, Frequency counter
	1d. Use electronic workshop tools for building and wiring electronic circuits with necessary safety	1.5 Electronic Workshop Tools**:** Bread board, Copper clad laminate sheet, Solder iron, solder-stand, solder-wire, flux, flexible wire, hookup wire, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, de-solder pump, De-solder wick, drilling machine
Unit– II **Building, Wiring, Soldering and Testing of Electronic Circuits**	2a. Sketch the standard symbols of various active and passive electronic components 2b. Draw the electronic circuits using standard symbols	2.1 Electronic circuit Drawing • Series and Parallel network using Resistors, Capacitors, T-type/ π-type attenuator, • Circuit diagram for: - forward/reverse biased PN Junction diode - Half wave, Full wave and Bridge Rectifier using diode - characteristics of Zener diode/ LED/ Photo diode/LDR - Transistor characteristics in CE/CB configuration - Zener diode as shunt regulator - Transistorized shunt/ series regulators - +5V, -5V, +/-5V dc regulated power supply using IC 78XX / 79XX with

Unit	Major Practical Learning Outcomes	Topics and Sub-topics
		LED indication - LM317 variable voltage regulator - Clipper/Clamper - Low pass filter, High pass filter, Band pass filter, Band elimination filter - Light operated Relay - Transistorized touch control switch - Rain drop detector
	2b. Build/test and troubleshoot electronic circuits on breadboard 2c. Build/test electronic circuits on general purpose PCB	2.2 Electronic circuit on bread board 2.3 Soldering/desoldering, electronic circuit on general purpose PCB
Unit– III **Use of Data sheets for Component Selection and Specification**	3a. Find the specification of electronic component from data sheet/data manual. 3b. Select appropriate component for given circuit application. 3c. Select specification of Surface Mount Device (SMD) components as required.	3.1 Manufacturer's Datasheet of: - Diodes IN4001 to 07, IN4148; 2N5402, 2N5408, BY127 - Zener Diode, Photo diode, LED, Varactor diode, Seven segment LED - Transistors BC107, BC177, BC547/548, SL100, SK100, AC127/128, BF194, TIP122, Photo transistor - voltage regulator IC78XX, 79XX, LM317 - Packages of various SMD components: Resistor, Capacitor, Inductor, Diode-LL4148, SM4007, Chip transistor, Chip Darlington transistor, Bridge rectifier
Unit – IV **Schematic, Layout and Tracing of Electronic Circuits**	4a. Create PCB layout manually. 4b. Create schematic and layout of given electronic circuit using any Simple PCB design software. 4c. Trace circuit from given PCB layout on the PCB.	4.1 Manually Prepare PCB layout on graph paper 4.2 PCB design software 4.3 PCB layout - Component side and copper side 4.4 Tracing for PCB Fabrication 4.5 Tracing of circuit on PCB
Unit – V **Mini Project**	5a. Fabricate PCB & build the given circuit on the PCB. 5b. Test the assembled circuit on PCB. 5c. Prepare project report in proper format.	5.1 Fabrication of PCB, component mounting, Soldering, testing & troubleshooting of circuits on PCB

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Electronic Components, Measuring Instruments and Tools	Not applicable				
II	Building, Wiring, Soldering and Testing of Electronics Circuit					
III	Use of Data sheets for Component Selection and Specification					
IV	Schematic, Layout and Tracing of Electronic Circuits					
V	Mini Project					

Legends: R = Remember; U = Understand; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical exercises should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the above mentioned expected competency. In some of the practical exercises from S.No.8 onwards, the identified list is for for guideline only. Other necessary electronic tools, components ,circuits etc. can also be included by considering contents of current semester subjects like 'Electronic Components & Practice' (ECP), 'Electronic Circuits and Applications' (ECA) or 'Electronic Networks' (EN).

S. No.	Unit No.	Practical Exercises	Approx. Hrs Required
1	I & II	Draw symbols of various electronic components on drawing sheets.	02
2	I & II	Draw the circuit diagrams of various (Simple to Complex) electronic circuits on drawing sheets.	04
3	I	Compare the values with the measured by using measuring instruments like Digital Multimeter, LCR-Q Meter: Resistors inductors, capacitors, potentiometers, Trimmers,Thermistor, Transformer, auto transformer.	04
4	I	Identify the terminals of the following components: Diode, Zener diode, Varactor diode, LED, Photo diode, BJT**,** Photo transistor, FET, LDR, Solar cell, Photocell, Opto-coupler,7 Segment Display,Relays	02
5	I	Use the following instruments to measure the parameters of any electronic circuit : Function Generator, Frequency counter, CRO, and DSO, with all safety precautions.	02
6	I	Provide some exercises so that the following electronics hardware tools and materials are learned to be used by the students (as a	02

S. No.	Unit No.	Practical Exercises	Approx. Hrs Required
		guideline only): (a) Bread board (b) Copper clad laminate sheet (c) Solder iron, solder-stand (d) Solder-wire, flux (e) Flexible wire (f) Hookup wire (g) Cutter (h) Nose plier (i) Screwdriver set (j) Wire stripper (k) De-solder pump (l) De-solder wick (m) Drilling machine .	
7	II	Sketch, mount and test at least six from following electronic circuit on bread board (Circuits given as a guideline only): (a) T type attenuator (b) π-type attenuator (c) Forward/reverse biased PN Junction diode (d) Zener diode as shunt regulator (e) Opto coupler using LED & Photo diode (f) Half wave Rectifier, Full wave & Bridge rectifier (g) Light operated relay (h) Diode clipper (i) Diode clamper (j) Transistorized series regulator (k) +/- 5V Regulated power supply with LED indication (l) Low pass filter, High pass filter (m) Band pass filter, Band elimination filter (n) Variable power supply using LM317.	06
8	II	Sketch, mount, wire, solder and test at least six from electronic circuits (mentioned in S.No. 9 above) on general purpose board.	06
9	II	De-solder given circuit(s) from general purpose printed circuit board.	02
10	III	Find Specifications and package of following components from Datasheet. (as a guideline only): (a) Diodes IN4001 to 1N4007, IN4148, 2N5402, 2N5408,BY127 (b) Zener Diode - 5V6 (c) Photo diode - BPW10 (d) LED - LED 55 (e) Varactor diode (f) Seven segment LED (g) Transistors BC107, BC177, BC547/548, (h) Transistors SL100, SK100, AC127/128, BF194, TIP122 (i) IC 78XX, 79XX (j) LM317 (k) SMD components: Resistor, Capacitor, Inductor & Diode-LL4148, SM4007, Chip transistor, Chip Darlington transistor, Bridge rectifier.	04
11	4	1.Prepare layout (Manually) of a given circuit on paper. 2.Create schematic and layout of given electronic circuit using any PCB design software:	06

S. No.	Unit No.	Practical Exercises	Approx. Hrs Required
		(a) +/-12V Regulated Power supply Using 7812 & 7912 (b) Light operated Relay (c) TV remote checker using transistor ,IR photo diode, red LED (d) Touch switch using transistor (e) Door safety using Reed and magnet (f) Water level alarm using single transistor (g) Opaque Object sensing alarm using LDR, transistor & Buzzer	
12	IV	Trace electronic circuit from the given PCB layout of an electronic circuit.	02
13	V	**Mini project 1** Create schematic, layout and fabricate PCB for given electronic circuit and prepare brief report on it.	06
14	V	**Mini project 2** Build experiment board (at least one) from following on Hylem sheet and wooden casing in group of five students maximum. (as a guideline only): a) PN junction diode characteristics b) Zener diode characteristics c) LED characteristics d) Half wave, full wave, bridge rectifiers e) Transistor characteristics f) LDR characteristics g) +/-5V dc regulated power supply using LM7805 &LM7905.	06
15	V	**Mini project 3** Build extension board with four 5-pin socket, four switches, fuse and indicating lamp. (This is for guideline only; faculty can allot other required electrical wiring related project).	04
		Total	**58**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

- Prepare charts related to the first year electronic courses in a group of maximum 3 students.
- Develop at least two mini projects and their brief report
- Explore at least one circuit using diodes and transistors from internet
- Search the data sheet on web for the given component as literature survey
- Prepare Presentation (PPT) on their project work or on any advanced topic.
- Prepare budget for electrical wiring/system for any given house.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Title of Book	Author	Publication
1	Printed Circuit Boards: Design and Technology	Bossart	TMH, 2008 or latest edition
2	Build Your Own Printed Circuit Board	Al Williams	Mc GrawHill, 2003 or latest edition

S. No.	Title of Book	Author	Publication
3	Making Printed Circuit Boards	Jan Axelsen	Mc GrawHill, 1993 or latest edition
4	Modern World Transistor Data & Its Equivalent	Lotia, M.	B P B, 2008
5	Zener Diodes & Their Application	Mishra, T.R	B P B, 2003
6	Electronic Formulas, Tables Symbols	Sharma, M.C	B P B, 2008
7	Everyday Electronics Data Book	Mike Tooley	B P B, 2011
8	Hobby Electronics Project Special	BPB	B P B, 2011

B. List of Major Equipment/ Instrument:

i. Multimeter, CRO, DC Power supply, Function generator, LCR –Q meter.
ii. Drilling Machine with drill bits
iii. Solder iron, Solder-stand, De-soldering pump
iv. Cutter, Nose plier, screw driver set, Wire stipper, Desolder wick, Flux, Solder wire, Hook up wire, Flexible wire, Hylem board
v. Bread board, General purpose Copper clad laminate sheet

C. List of Software/Learning Websites

i. http://eecs.vanderbilt.edu/courses/ee213/Breadboard.htm
ii. http://eecs.vanderbilt.edu/courses/ee213/Breadboard.htm
iii. http://wiring.org.co/learning/tutorials/breadboard/index.html
iv. http://www.kpsec.freeuk.com
v. http://courses.engr.illinois.edu/ece343/breadboard.htm
vi. http://library.thinkquest.org/16497/projects/index.html
vii. http://www.technologystudent.com/elec1/tranbrd1.htm
viii. http://circuiteasy.com/
ix. www.expresspcb.com/expresspcbhtm/download.htm
x. www.freepcb.com/
xi. http://www.circuitstoday.com/simple-electronics-projects-and-circuits
xii. http://www.buildcircuit.com/5-beginners-projects-that-work-in-the-first-attempt/

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. S. J. Chauhan**, HOD (EC) , Government Polytechnic, Rajkot
- **Prof. T. P. Chanpura**, Lecturer EC, Government Polytechnic, Ahmedabad
- **Prof. S. G. Valvi**, Lecturer EC, Government Polytechnic, Palanpur
- **Prof. J. A. Patel**, Lecturer EC, Vallabh Buddhi Polytechnic, Navsari

Coordinator & Faculty Members from NITTTR Bhopal

- **Dr. Joshua Earnest**, Professor and Head, Dept. of Electrical and Electronics Engg.
- **Dr.(Mrs.) Anjali Potnis**, Assistant Professor, Dept. of Electrical and Electronics Engg.